2.0.4 SITING CRITERIA FOR CRITERIA POLLUTANTS

2.0.4.1 INTRODUCTION

This operating procedure contains siting criteria to be applied to ambient air quality analyzers and samplers or monitoring probes after the station location has been selected based on the monitoring objectives and spatial scale of representativeness as discussed in Appendix D of the Environmental Protection Agency's (EPA) 40 CFR, Part 58. Adherence to these siting criteria is necessary to ensure the uniform collection of compatible and comparable air quality data.

The probe or sampler siting criteria discussed below must be followed to the maximum extent possible. It is recognized that there may be situations when the siting criteria cannot be followed. If the siting criteria cannot be met, this must be thoroughly documented with a written waiver request that describes how and why the siting criterion differs. This documentation should help to explain later questions about the ambient air monitoring data.

The spatial scales of representativeness (i.e., micro, middle, neighborhood, urban, and regional) are defined and discussed in Appendix D of 40 CFR, Part 58. The pollutant specific probe siting criteria generally applies to all spatial scales except where noted. Specific siting criteria prefaced with a "must" are defined as a requirement and exceptions must be approved through the 40 CFR, Part 58 waiver provisions. Siting criteria prefaced with a "should" are defined as a goal to meet for consistency but are not a requirement.

The Quality Assurance Section has designed the "Quality Assurance Site Survey Report (see Figure 2.0.4.2) to document permanent siting information which applies to all pollutants. The guidelines for filling in the requested information are contained in Section 2.0.4.8.

2.0.4.2 SULFUR DIOXIDE (SO2)

Horizontal and Vertical Probe Placement - The most desirable height for an SO2 monitor sample inlet probe is near the breathing height. Various factors, such as prevention of vandalism, security, and safety precautions, may require that the inlet probe be elevated. Therefore, the inlet probe must be located 3 to 15 meters above ground level.

If the inlet probe is located on the side of a building, then it should be located on the windward side of the building relative to the prevailing winter wind direction. The inlet probe must also be located more than 1 meter vertically or horizontally

away from any supporting structure, and away from dirty, dusty areas. If the inlet probe is located on a roof or other structure, it must be at least 1 meter from walls, parapets, penthouses, etc.

Spacing From Obstructions - The inlet probe must be located away from obstacles and buildings, and would be considered to be obstructed if an imaginary line extended 30 degrees up from the horizontal and rotated 360 degrees intersects any obstruction within 30 meters. The distance between the obstacles and the inlet probe must be at least twice the height that the obstacle protrudes above the inlet probe. Sampling stations that are located closer to obstacles than this criterion allows should be classified as middle scale rather than neighborhood scale, since the measurements from such a station would closely represent middle scale stations. Airflow must also be unrestricted in an arc of at least 270 degrees around the inlet probe, and the predominant wind direction for the season of greatest pollutant concentration potential must be included in the 270 degrees arc. If the probe is located on the side of a building, 180 degrees of clearance is required.

Spacing From Trees and Other Considerations - Trees can provide surfaces for SO2 adsorption and act as an obstruction to the normal wind flow patterns. To minimize the possible effects of trees on the measured SO2 levels, the inlet probe should be placed at least 20 meters from the dripline of trees. However, in situations where trees could be classified as an obstruction, i.e., the distance between the tree(s) and the inlet probe is less than twice the height that the tree(s) protrudes above the probe, the probe must be placed at least 10 meters from the dripline of the obstructing tree(s). No furnace or incineration flues or other minor sources of SO2 should be nearby. The separation distance is dependent on the height of the flues, type of waste or fuel burned, and the quality of the fuel (sulfur content).

2.0.4.3 CARBON MONOXIDE (CO)

Horizontal and Vertical Probe Placement - Because of the importance of measuring population exposure to CO concentrations, air should be sampled at average breathing heights. For consistency and comparability, it would be desirable to have all inlets at exactly the same height, but practical considerations often prevent this. The required height of the sample inlet probe for CO monitoring is 3 +/- 1/2 meters for a microscale site, which is a compromise between representative breathing height and prevention of vandalism. The recommended 1-meter height range is also a compromise to some extent. Some reasonable range must be specified and 1 meter provides adequate leeway to meet

most requirements. For middle and neighborhood scale stations, the vertical concentration gradients are not as great as for the microscale station. This is because the diffusion of CO from road locations is greater and the concentrations would represent larger areas than for the microscale station. Therefore, the required height of the sample inlet probe is 3 to 15 meters for middle and neighborhood scale stations. The inlet probe must be located more than 1 meter in the vertical or horizontal direction from any supporting structure.

Spacing from Obstructions - Airflow must be unrestricted in an arc of at least 270 degrees around the inlet probe, and the predominant wind direction for the season of greatest pollutant concentration potential must be included in the 270 degrees arc. If the probe is located on the side of a building, 180 degrees of clearance is required.

Spacing from Roads - Street canyon and traffic corridor stations (microscale) are intended to provide a measurement of the influence of the immediate source on the pollution exposure of the population. In order to provide some reasonable consistency and comparability in the air quality data from such stations, inlet probes must be between two and ten meters from the edge of the nearest traffic lane. This should give consistent and comparable data, yet allow flexibility finding suitable probe and monitoring locations.

Street canyon/corridor (microscale) inlet probes must be located at least 10 meters from an intersection and preferably at a midblock location. Middle of the block locations are preferable to intersection locations because intersections represent a much smaller portion of downtown space than do the streets between them. Pedestrian exposure is also probably greater in street canyon/corridors than at intersections. Also, the practical difficulty of positioning sampling inlets is less at midblock locations than at the intersections. However, the final siting of the monitor must meet the objectives and intent of Appendix D, Section 2.4 and Appendix E, Section 4 of 40 CFR, Part 58.

In determining the minimum separation between a neighborhood scale monitoring station or probe and a specific source, the presumption is made that measurements should not be unduly influenced by any one roadway. The following table provides the minimum separation distance between roadways and inlet probes. Sampling stations that are located closer to roads than this criterion allows should be classified as middle scale, since the measurements from such stations would more closely represent the middle scale rather than neighborhood scale.

MINIMUM SEPARATION DISTANCE BETWEEN NEIGHBORHOOD SCALE CO STATIONS AND ROADWAYS (EDGE OF NEAREST TRAFFIC LANE).

Roadway average daily traffic (ADT), vehicles per day	Minimum separation distance between stations and roadways,(meters)
≤ 10,000	≥ 10 *
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥ 60,000	≥ 150

* Distances should be interpolated based on traffic flow.

Spacing from trees and other considerations - Since CO is relatively nonreactive, the major factor concerning trees is obstructions to normal wind flow patterns. For middle and neighborhood scale stations, trees should not be located between the major sources of CO, usually heavily traveled roads, and the inlet probe. The probe must be at least 10 meters from the tree dripline, which is between the probe and the road and extends at least five meters above the probe. For microscale stations, no trees or shrubs should be located between the inlet probe and road.

2.0.4.4 OZONE (O3)

Horizontal and Vertical Probe Placement - The ozone monitor inlet probe should be as close as possible to the breathing zone. Complicating factors may require that the probe be elevated. The sample inlet probe height must be 3 to 15 meters above ground level. The probe must also be located more than one meter vertically or horizontally away from any supporting structure.

Spacing from Obstructions - The probe must be located away from obstacles and buildings such that the distance between the obstacles and the inlet probe is at least twice the height that the obstacle protrudes above the probe. The probe would be considered to be obstructed if an imaginary line extended 30 degrees up from the horizontal and rotated 360 degrees intersects any obstruction within 30 meters. Airflow must be unrestricted in an arc of at least 270 degrees around the

inlet probe, and the predominant wind direction for the season of greatest pollutant concentration potential must be included in the 270 degrees arc. If the probe is located on the side of a building, 180 degrees of clearance is required.

Spacing from Roads - It is important in the probe siting process to minimize destructive interference from sources of nitric oxide (NO), including parking lots, driveways, and traffic alleys since NO readily reacts with ozone. The table below provides the required minimum separation distances between roadways and ozone monitoring stations. These distances were based on recalculations using modern methodology references and validated using more recent ambient data collected near a major roadway. Sampling stations that are closer to roads than this criterion allows should be classified as middle scale rather than urban or neighborhood, since the measurements from such stations would more closely represent the middle scale.

MINIMUM SEPARATION DISTANCE BETWEEN NEIGHBORHOOD AND URBAN SCALE OZONE STATIONS AND ROADWAYS (EDGE OF NEAREST TRAFFIC LANE)

Roadway average daily traffic, (ADT) vehicles per day	Minimum separation distance between stations and roadways, (meters)
≤10,000	≥ 10 *
15,000	20
20,000	30
40,000	50
70,000	100
≥110,000	≥250

* Distances should be interpolated based on traffic flow.

Spacing from trees and other considerations - Trees can provide surfaces for O3 adsorption and/or reactions as well as obstruct normal wind flow patterns. To minimize the possible effect of trees on measured O3 levels; the probe should be placed at least 20 meters from the dripline of trees.

Since the scavenging effect of trees is greater for ozone than for other criteria pollutants, strong consideration of this effect must be given in siting the O3 inlet probe to avoid this problem. Therefore, the probe must be at least 10 meters from the dripline of trees that are located between the urban city core area and the inlet probe along the predominant summer daytime wind direction.

2.0.4.5 NITROGEN DIOXIDE (NO2)

Horizontal and Vertical Probe Placement - The height of the NO2 sample inlet probe must be 3 to 15 meters above the ground. This is a compromise between measuring the breathing zone and avoiding vandalism. For NO2, height does not appear to be a critical factor since the NO2 should be fairly well mixed and somewhat uniform in the vertical direction. The distance of the inlet probe from any supporting structure must be greater than 1 meter vertically or horizontally.

Spacing from Obstructions - Buildings and other obstacles may possibly scavenge NO2. In order to avoid this kind of interference, the probe must be located well away from obstacles so that the distance between obstacles and the inlet probe is at least twice the height that the obstacle protrudes above the probe. The probe would be considered to be obstructed if an imaginary line extended 30 degrees up from the horizontal and rotated 360 degrees intersects any obstruction within 30 meters. Probes that are located closer to obstacles than this criterion allows should be classified as middle scale, rather than urban or neighborhood scales since the measurements more closely represent middle scale results. For similar reasons, probe inlets along vertical walls are undesirable because air moving along that wall may be subject to possible removal mechanisms. There must be unrestricted airflow in an arc of at least 270 degrees around the inlet probe, and the predominant wind direction for the season of greatest pollutant concentration potential must be included in the 270 degrees arc. If the probe is located on the side of the building, 180 degrees of clearance is required.

Spacing from Roads - It is important that the probe be removed from oxides of nitrogen sources to avoid measurements being dominated by any one source and to allow time for conversion (reactions) of NO emissions to NO2. Further, the effects of roadway sources must be minimized by using separation distances for neighborhood and urban scale stations found in the table below. The minimum separation distance must also be maintained between an NO2 probe and any other similar volume of automotive traffic such as parking lots. Probes that are located closer to roads than this criterion allows should not generally be classified as neighborhood or urban scales.

MINIMUM SEPARATION DISTANCE BETWEEN NEIGHBORHOOD AND URBAN SCALE NO2 STATIONS AND ROADWAYS (EDGE OF NEAREST TRAFFIC LANE)

Roadway average daily traffic (ADT) vehicles per day	Minimum separation distance between stations and roadways, (meters)
≤10,000	≥ 10 *
15,000	20
20,000	30
40,000	50
70,000	100
≥110,000	≥250

* Distances should be interpolated based on traffic flow.

Spacing from trees and other considerations - Trees can provide surfaces for NO2 adsorption and/or reactions as well as obstruct normal wind flow patterns. To minimize the possible scavenging effect of trees on the measured NO2 levels, probes should be placed at least 20 meters from the dripline. For trees that protrude above the height of the probe by 5 meters or more, the probe must be at least 10 meters from the tree dripline.

2.0.4.6 LEAD AND TOTAL SUSPENDED PARTICULATES (TSP) HIGH VOLUME SAMPLER

Vertical Placement - Available studies show a distinct variation in the distribution of TSP and lead levels near roadways. TSP, which is greatly affected by gravity, has large concentration gradients, both horizontal and vertical, immediately adjacent to roads. Lead, being predominately submicron in size, behaves more like a gas and exhibits smaller vertical and horizontal gradients than TSP.

Studies of the relationship between roadway placement of lead samplers and measured ambient concentrations do not typically indicate large gradients within the first six to seven meters above ground level. Similar to other pollutant monitoring, optimal placement of the sampler inlet for lead monitoring should be at breathing height level. However, practical factors such as prevention of vandalism, security, and safety precautions must also be considered when siting a sampler. Given these considerations, the sampler inlet for microscale lead

samplers must be two to seven meters above ground level. The lower limit was based on a compromise between ease of servicing the sampler and the desire to avoid unrepresentative conditions due to reentrainment from dusty surfaces. The upper limit represents a compromise between the desire to have measurements that are most representative of population exposures and a consideration of the practical factors noted above.

For middle or larger spatial scales, increased diffusion results in vertical concentration gradients, which are not as great as for the small scales. Thus, the required height of the air intake for middle or larger scales is 2 to 15 meters.

Spacing from Obstructions - The sampler must be located away from obstacles such as buildings, so that the distance between obstacles and the sampler is at least twice the height that the obstacle protrudes above the sampler. The sampler is considered to be obstructed if an imaginary line extended 30 degrees up from the horizontal and rotated 360 degrees intersects any obstruction within 30 meters. There must be unrestricted airflow in an arc of at least 270 degrees around the sampler. Since the intent is to measure the maximum concentrations from a road or point source, there must be no significant obstruction between a road or point source and the monitor, even though other spacing from obstruction criteria are met. The predominant direction for the season with the greatest pollutant concentration potential must be included in the 270 degrees arc.

A minimum of two meters of separation from walls, parapets, and penthouses is required for rooftop samplers.

Spacing from Roadways - Ambient lead levels near a mobile source are a function of the traffic volume and are most pronounced at Average Daily Traffic flows (ADT) $\geq$30,000 vehicles within the first 15 meters, on the downwind side of the roadways. Therefore, stations measuring mobile source peak concentrations should be located at the distance most likely to produce the highest possible concentrations. For microscale stations, the location must be between 5 and 15 meters from the major roadway. For various scale stations, the ranges of acceptable distances from the major roadway is shown in the table below. These distances are based upon the historic data referenced in 40 CFR, Part 58 which illustrates that lead levels remain fairly constant after certain horizontal distances from the roadway. As depicted in the above reference, this distance is a function of the traffic volume.

SEPARATION DISTANCE BETWEEN LEAD STATIONS AND ROADWAYS (EDGE OF NEAREST TRAFFIC LANE)

Roadway average daily traffic (ADT) vehicles per day	Separation distance between stations and roadways, meters		
	Micro-Scale	Middle Scale	Neighborhood Urban Scale
≤ 10,000	5-15	>15-50*	>50*
20,000	5-15	>15-75	>75
≥ 40,000	5-15	>15-100	>100

*Distances should be interpolated based on traffic flow.

Spacing from trees and other considerations - Trees can provide surfaces for deposition or adsorption of lead particles and obstruct normal wind flow patterns. For microscale and middle scale stations there must not be any tree(s) between the lead source, i.e., the vehicles on the roadway, and samplers. For neighborhood scale stations, samplers should be at least 20 meters from the tree dripline. Samplers must, however, be placed at least 10 meters from the tree dripline, which could be classified as an obstruction, i.e., the distance between the tree(s), and the sampler is less than the height that the tree protrudes above the sampler.

No furnace or incinerator flues should be nearby. The height and type of flues and the type, quality, and quantity of waste or fuel burned determine the separation distances. For example, if the emissions from a chimney have a high lead content and there is a high probability that the plume would impact on the sampler during most of the sampling period, then other buildings/locations in the area that are free from the described sources should be chosen for the monitoring site.

2.0.4.7 PARTICULATE MATTER (PM2.5, PM10, and DICHOTOMOUS SAMPLERS): TAPERED ELEMENT OSCILLATING MICROBALANCE (TEOM): NEPHELOMETER: RESEARCH APPLIANCE CORPORATION AISI TAPE SAMPLER: BETA ATTENUATION MONITOR (BAM)

Particulate matter (PM) (PM2.5 and PM10) is intermediate in size between the two extremes of TSP and lead particle size and exhibits dispersion properties of both gas and settable particulates and does show vertical and horizontal gradients. Similar to monitoring for other pollutants, optimal placement of the PM10 sampler should be at breathing height level. However, practical factors such as preventing vandalism, security, and safety precautions must also be considered when siting PM samplers. Given these considerations, the sampler inlet for microscale PM monitors must be 2 to 7 meters above ground level. The lower limit was based on a compromise between ease of servicing the sampler and the desire to avoid reentrainment from dusty surfaces. The upper limit represents a compromise between the desire to have measurements that are most representative of population exposures and a consideration of the practical factors noted above.

For middle or larger spatial scales, increased diffusion results in vertical concentration gradients that are not as great for the microscale. Thus, the required height of the air intake for middle or larger scales is 2 to 15 meters.

Spacing from Obstructions - If the sampler is located on a roof or other structure, there must be a minimum of 2 meters separation from walls, parapets, penthouses, etc.

Trees provide surfaces for particulate deposition and restrict airflow. Therefore, samplers should be placed at least 20 meters from the dripline and must be 10 meters from the dripline when the tree(s) acts as an obstruction.

Samplers must also be located away from obstacles such as buildings, so that the distance between obstacles and the sampler is at least twice the height that the obstacle protrudes above the sampler. The sampler is considered to be obstructed if an imaginary line extended 30 degrees up from the horizontal and rotated 360 degrees intersects any obstruction within 30 meters. Samplers that are located closer to obstacles than this criterion allows should be classified as middle scale, rather than urban or neighborhood scales since the measurements more closely represent middle scale results.

There must be unrestricted airflow in an arc of at least 270 degrees around the sampler, except for street canyon sites. The predominant direction for the season

with the greatest pollutant concentration potential must be included in the 270 degrees arc. Since the intent of a category (a) site is to measure the maximum concentrations from a road or point source, there must be no significant obstruction between a road or point source and the monitor, even though other spacing from obstruction criteria are met.

Spacing from Roads - Since emissions associated with motor vehicles contribute to urban area ambient particulate matter levels, spacing from roadway criteria is necessary for ensuring national consistency in particulate sampler siting.

The intent is to place National Air Monitoring Stations (NAMS) sites in areas of highest concentrations whether from mobile or multiple stationary sources. If the area is primarily affected by mobile sources and the maximum concentration area a traffic corridor or street canyon, then the samplers should be located near roadways with the highest traffic volume and at separation distances most likely to produce the highest concentrations. For microscale traffic corridor station, the location must be between 5 and 15 meters from the major roadway. For middle scale stations, a range of acceptable distances from the roadway is shown in Figure 2.0.4.1. This figure also includes separation distances between a roadway and neighborhood or larger scale station by default. Any station 2 to 15 meters high and further back than the middle scale requirements will generally be neighborhood, urban or regional scale. For example, according to Figure 2.0.4.1, if a particulate sampler is primarily influenced by roadway emissions and that sampler is set back 10 meters from a 30,000 ADT road, the station should be classified as a microscale, if the sampler height is between 2 and 7 meters.

If the sampler height is between 7 and 15 meters, the station should be classified as middle scale. If the sampler is 20 meters from the same road, it will be classified as middle scale; if 40 meters, neighborhood scale; and if 110 meters, an urban scale.

No furnace or incineration flues should be nearby. The separation distance from flues is dependent on the height of the flues, type of waste or fuel burned and quality (ash content) of the fuel. In the case of emissions from a chimney resulting from natural gas combustion, the sampler should be placed at least 5 meters from the chimney, as a precautionary measure. If fuel oil, coal, or solid waste is burned and the stack is sufficiently short so that the plume could reasonably be expected to impact on the sampler intake a significant part of the time, other buildings/locations in the area that are free from these types of sources should be considered for sampling.

ACCEPTABLE AREA FOR PM MICRO, MIDDLE, NEIGHBORHOOD, AND URBAN SAMPLERS EXCEPT FOR MICROSCALE STREET CANYON SITES

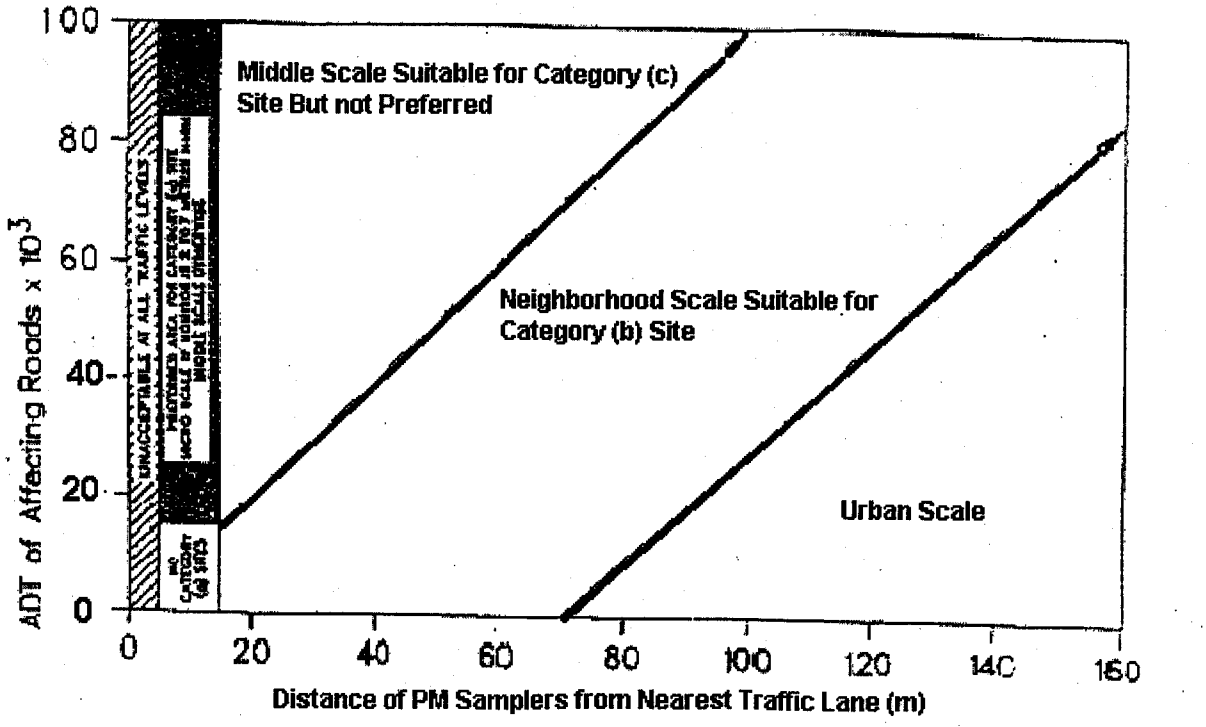

Figure 2.0.4.1
Acceptable Areas for PM10 Siting

2.0.4.8 INSTRUCTIONS FOR THE COMPLETION OF THE QUALITY ASSURANCE SITE SURVEY REPORT FORM

The Quality Assurance Site Survey Report form (Figure 2.0.4.2) is to reflect the conditions of cleanliness, calibrations, in-line filter changes, etc., found at sites during audits. Permanent siting information should be confirmed each time a site is visited. The Site Survey is to be partially filled out in the office from file information while preparing for an audit and completed at the site. The gray shaded areas are information that does not apply to a specific parameter. Other areas that do not apply to a specific method or device should be marked "n/a".

As much information as possible on the first page is to be filled out in the office from the file information before going to the site. The "Sampler Type" and "Site Survey Accurate and Complete" columns must be confirmed during the audit. The "Audit Information" blanks (Auditors, Date, Station Temperature, Action Items) should reflect the conditions found during the audit. Under "Action Items" note discrepancies between the site survey and actual conditions, Air Quality Data Actions (AQDAs), and conditions at the site that need attention.

When doing SSI, PM10, TSP, Lead, or Acid Deposition audits, note the cleanliness of the sampler under "Cleanliness - Probe Clean". Otherwise, note the cleanliness of the probe/sample line and manifold in the appropriate spaces. Note the calibration status and the presence and state of the quality assurance, station, and instrument logs and manuals. Note the dates of the in-line filters and the NOx converter changes and make comments about the site conditions in general. Note changes since the last audit.

All information should be confirmed by interviewing the site operator or district (or ARB AQSB) personnel and by measuring distances and directions. Information derived from the Site Initiation/Identification Reports, or other means, should be confirmed by field investigation and measurement. Any information not confirmed should be noted (and why not confirmed), and the source should be stated. Enter all distances, heights, etc., in meters. The direction of an obstacle, local source, etc., should be entered based on an eight-point compass (north, northeast, east, etc.).

The following are guidelines for filling in the requested information:

Site Name - Enter the full station name.

ARB Number - Enter the Air Resources Board (ARB) site number.

AIRS Number - Enter the EPA Aerometric Information Retrieval Systems (AIRS) number for the site.

Agency - Enter the name of the agency responsible for operation of the station.

Audit Date - Enter the date audit is conducted.

Auditors - Enter the name of the auditor(s) filling out the site survey.

Site Contact - Enter the name of the site operator or technician.

Latitude/Longitude - Enter the GPS location of the station. If the GPS is not available, a notation should be made in the latitude/longitude space stating that the measurements could not be verified by GPS.

Elevation - The elevation in meters above sea level. We should know the approximate elevation of the site from the Site Report and what the site operator thinks the elevation is. We also should check the elevation on topographic maps. There should be general agreement between the Site Report elevation, the value obtained from the site operator, and the map reading. Since the GPS often gives highly variant readings and has accuracy of only +300 m (1000 ft), it does not give the vertical resolution we need. Note in the comments the source of the elevation value.

Site Phone - Enter the phone number of the site operator or technician or for the phone located at the site.

Site Report - Enter “Y” if site report is complete. Enter “N” if site report not complete.

Site Photos - Enter “Y” if digital site photos were taken for the site. If the photos were not taken, enter “N”.

Station Temperature - Indicate whether the station is temperature controlled, and whether the temperature is recorded. Record the temperature.

Collocated Meteorological - Enter if there are meteorological data taken at the station in addition to the pollutant data. If there is collocated met, the met instruments should be included in the survey.

Shadowing - Enter whether any objects cast a shadow on the acid deposition samplers, solar radiation sensor, or rain gauge. Include overhead powerlines, met tower guy lines, etc.

Boom Orientation - Enter the direction the boom aims in terms of N/S or E/W.

Temperature Radiation Shield Aspirated? - Indicate whether the temperature or relative humidity radiation shield has a motor driven aspiration system.

Traffic - The scale of monitoring is often related to the distance from traffic. After entering the required traffic information, cross relate this to the scale of monitoring. (Tables in Section 2.0.4.3 through 2.0.4.6 and Figure 2.0.4.1).

> Description - Enter the traffic category (residential, industrial, freeway, arterial, commercial, other) or other descriptor of traffic in the area. Describe all nearby streets and highways that could impact the station. For example, if a station is in a residential area, but there is an interstate highway a half kilometer away, the station would be residential; however, also note the highway distance, direction, and count. Parking lots are a special consideration; they are directly addressed only by NO2 and Wet Acid Deposition. Unless it is a very busy parking lot (greater than 10,000 vehicles per day), describe the traffic on the nearest street. Note the parking lot in the comments.
>
> Distance - Enter the distance to the above traffic. Measure the distance to the nearest traffic lane (aisles in parking lots are not considered traffic lanes). See Tables in Sections 2.0.4.3 through 2.0.4.6 and Figure 2.0.4.1 for the separation distances required for the various monitoring scales.
>
> Count - Enter an approximate daily traffic volume vehicle count. Use the CalTrans traffic count book in each van whenever possible. Otherwise, take three five-minute counts during the day and calculate the daily average.

Non-Vehicular Local Sources:

Description - Enter a brief description of any local sources of the pollutant being monitored.

Distance - Enter the distance to the local sources described above.

Direction - Enter the direction to the local sources described above.

Dominant Influence - Enter the dominant influence category (industrial, residential, commercial, vehicular, near urban, agricultural, recreational area, or other). Base the dominant influence category on the greater of local source or traffic influences. The dominant influence can be different for each pollutant.

Topography - Enter a one or two word description of the topography in the immediate vicinity of the site (surrounding few hundred meters), and in the general region (surrounding tens of kilometers) (for example: level, hilly, valley, mountainous, etc.).

Urbanization - Enter the urbanization category of the site: center city, suburban, rural, or remote.

Ground Cover - Enter a short description of the ground cover in the vicinity of the sampler/probe for 100 meters (i.e., flat built-up roof, grassy field, or whatever is around and under the sampler/probe).

QA Plan - Indicate what quality assurance plan is used for the pollutant, and whether it has been approved.

Air Flow Arc - Enter the angle of free flow of air to the probe, sampler, or meteorological sensors. If there are obstacles, subtract the angle of interference from 360^{o}. Note in the comments the center line direction of the free flow arc.

Site Survey Complete - Enter “Y” if site survey is complete. Enter “N” if site survey is not complete.

Logbook Up to Date - If the station logbook is up to date, enter “Y”. If not, enter “N”.

QA Manual - If the QA Manual has been approved, enter “Y”. If not, enter “N”. Also, note what Agency approved the manual.

Probe/Manifold Clean - Indicate here if the probe/manifold is clean. If clean, enter “Y”. If not clean, enter “N”.

Schedule - Enter the schedule on which the probe and manifold are cleaned.

Autocalibrator Type - Indicate the manufacturer and model number of the autocalibrator used. Enter “N/A” if an autocalibrator is not used.

Action Items - Enter any comments about the site, station, or pollutant monitoring system. Also, indicate any notes and items not meeting siting criteria (if the requirement has been waived give the reason)

Instrument Type - Enter the manufacturer name and model name of the instrument.

Purpose:

> N/S/SP/PSD/PAMS - Enter N for NAMS, S for SLAMS, SP for Special Purpose, PSD for Prevention of Significant Deterioration, or PAMS for Photochemical Assessment Monitoring (this information is available in the SLAMS book).

Objective - Enter the objective of monitoring: highest concentration, representative concentration, maximum population, source impact, background concentrations, or other monitoring reason (this information is available in the SLAMS book).

Scale - Enter the spatial scale of monitoring (this information is available in the SLAMS book).

> Micro - Maximum concentration site, up to 100 meters in scale.
>
> Middle - Short term public health criteria site, 100 to 500 meters in scale (parking lots, feeder streets, etc.).
>
> Neighborhood - Homogenous urban subregion with regular shape, 0.5 to 4.0 kilometers in scale.
>
> Urban - Site representative of the entire metropolitan area, 4 to 50 kilometers in scale.

Regional - Site representative of a large regional area, 10's to 100's of kilometers in scale.

Height - Enter the height of the inlet or meteorological sensors above the ground and the height above the roof or any platform supporting them. Refer to the roof of a building as a platform, and note in the comments section that the sampler/probe is on the roof.

Spacing Between Samplers - Enter the distance to the nearest sampler if there is more than one sampler.

Manual Available - Enter “Y” if the manual for the instrument is available. Enter “N” if the manual is not available for the instrument.

Inst. Log Maint’d. & Avail. - If the instrument log is maintained and available, enter “Y”. If it is not, enter “N”.

In-Line Filter Change Date - If an in-line filter is used, indicate the date it was last changed.

Cal. Gas Cert. Date - Enter the date that the calibration gas was last certified.

Calibration - Enter the date the instrument was last calibrated. If the calibration is current, enter “Y”. If the calibration is past due, enter “N”.

Cal. Equip. Cert. Date - Enter the certification date of the calibration equipment used.

Description of Obstacle - An obstacle is any object that will disrupt the airflow patterns at the monitoring station. Thus, an obstacle can be almost anything: building, trees, etc. Minor objects such as telephone poles do not constitute obstacles unless they are very close to the inlet or meteorological sensors. Enter only objects that are obstacles. Generally, if an object's height above the inlet is less than one-half its distance from the inlet (one-tenth for meteorological sensors) it is not considered an obstacle (check the requirements for specific distances).

Dist./Direct. To Obstacle - Enter the distance to the obstacle. An object meeting the obstruction test within 30 m of the sampler/probe is an AQDA item; an object meeting the obstruction test beyond 30 m is a warning item. A reasonable guideline for evaluating an obstruction beyond 30 m is to determine if the object's width is more than one-half its distance from

the inlet at a height of one-half the object's distance (i.e., is an object 50 m from the inlet wider than 25 m, 25 m off the ground?). Predominant wind direction and stability are also important in evaluating whether an object is an obstruction. If there is a question whether an object is an obstruction, discuss it with the site operator and with the other auditors. If an object could become an obstacle (i.e., tree growth, etc.), discuss it in the comments section. Enter the direction of the obstacle.

Height Above Inlet - Enter the height of the obstacle above the height of the sampler/probe inlet or meteorological sensors. If the height of an obstruction cannot be readily measured, its height can be calculated by triangulation. Stand a distance from the obstruction (measure the distance). Use the clinometer part of the Brunton compass in the van met audit equipment to measure the angle to the top of the obstruction. Take the sine of the angle. Multiply the sine of the angle by the distance from the obstruction. Add the height of where the measurement was made (usually eye-level) to the calculated height.

Distance to Walls, etc.- If the inlet is on a roof, enter the distance to any walls, parapets, penthouses, etc. If the walls/parapets constitute obstructions, discuss them in the obstacles category.

Distance to Tree Dripline - Enter the distance to the nearest trees. If there are scattered nearby trees that could be considered obstacles, note them as obstacles. If the station is in a clearing edge of a forest, enter the distance to the forest edge. Enter an explanation in the comments section.

Residence Time - Enter the time it takes air to flow from the inlet to the manifold (in seconds). The ARB limit for the probe residence time is ten seconds or less. The probe residence time is calculated using the probe length and diameter, the total flow, and the following equation:

Residence time = (pi*inside diameter^2*length*0.015)/flow.

Probe:

Material - Enter the type of tubing from the probe inlet to the manifold, or analyzer if there is no manifold.

ID - Enter the inside diameter of the tubing (mm).

Length - Enter the length of tubing from the inlet to the manifold (in meters).

Flow - Enter the volumetric flow rate (in liters per minute).

Manifold:

Material - Enter the type and material of manifold used.

ID - Enter the inside diameter of the manifold (mm).

Length - Enter the length of the manifold (m).

Flow - Enter the total volumetric flow rate (in liters per minute).

Tubing to Instrument:

Material - Enter the type of typing used.

ID - Enter the inside diameter (mm) of the tubing.

Length - Enter the length of tubing used (m).

Flow - Enter the flow rate of the instrument (in liters per minute).

Total Residence Time - Enter the sum of the probe, manifold, and instrument tubing residence times. The total residence time for each instrument will be different. Calculate the manifold and instrument tubing residence times with the equation above; however, be sure to use the total flow rate to calculate the manifold residence time and only the instrument flow rate for the instrument tubing residence time calculation. The U.S. EPA limit for the total residence time is less than 20 seconds.

SITE SURVEY REPORT

Siting Information

Site Name:	Audit Date:	Latitude:	Site Report:
ARB Number:	Auditors:	Longitude:	Site Photos:
AIRS Number:		Elevation:	
Agency:	Site Contact:	Site Phone:	

General Siting Conditons

Station Temperature Controlled: Recorded: Inside:	Traffic description: distance: count:	Dominant Influence category:	QA Plan:	Probe/Manifold Clean:
		Topography Site: Region:	Air Flow Arc:	Schedule: Autocalibrator Type:
Meteorology Collocated: Shadowing: Boom Olentation: Temp. Rad. Shield Asp.:	Non-vehicular Local Sources Description: Distance: Direction:	Urbanization:	Site Survey Complete:	
		Ground Cover:	Logbook Up to Date:	
			QA Manual Approved: Agency:	

Action Items

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Figure 2.0.4.2
Quality Assurance Site Survey Report

SITE SURVEY REPORT (Cont'd.)

	Instrument Type	Purpose	Objective	Scale	Height Above Ground	Height Above Platform	Sampler Spacing	Manual Available	Inst. Log. Maint'd. & Avail	In Line Filter Change Date	Cal. Gas Cert. Date
O3											
SO2											
NO2											
CO											
H2S											
CH4											
THC											
NMHC											
PM10											
PM10 Colloc.											
PM2.5											
PM2.5 Colloc.											
PM2.5 Spec.											
TSP											
TSP Colloc.											
Lead											
Dichot											
TEOM											
BAM											
Temp.											
%RH											
Baro											
WS HORIZ.											
WS VERTICAL											
WD											
Solar											
Rain Gauge											
Toxics 920											
Carbonyl 925											
NMOC 910											
Wet/Dry Acid											
AISI Tape											
Nephelometer											

Figure 2.0.4.2 (cont.)
Quality Assurance Site Survey Report

SITE SURVEY REPORT (Cont'd.)

	Calibration		Cal. Equip. Cert. Date	Description of Obstacle	Dist./Direct. to Obstacle	Height above Inlet	Distance to Walls, etc.	Distance to Dripline	Residence Time
	Current	Cal. Date							
O3									
SO2									
NO2									
CO									
H2S									
CH4									
THC									
NMHC									
PM10									
PM10 Colloc.									
PM2.5									
PM2.5 Colloc.									
PM2.5 Spec.									
TSP									
TSP Colloc.									
Lead									
Dichot									
TEOM									
BAM									
Temp.									
%RH									
Baro.									
WS Horiz.									
WS Vertical									
WD									
Solar									
Rain Gauge									
Toxics 920									
Carbonyl 925									
NMOC 910									
Wet/Dry Acid									
AISI Tape									
Nephelometer									

Figure 2.0.4.2 (cont.)
Quality Assurance Site Survey Report

SITE SURVEY REPORT (Cont'd.)

Probe Residence Time Information

			Pollutant:				
	Probe	Manifold	Manifold to Instrument	Manifold to Instrument	Manifold to Instrument	Manifold to Instrument	Total Residence Time
Material							
ID (mm)							
Length (m)							
Flow (Q)							
Time							

Pull-down Options

Dominant Influence : vehicular/industrial

Topography : level/valley/hilly/mountainous

Urbanization : city center/surburban/rural/remote

Cleaning Schedule : weekly/bi-weekly/monthly/semi-annually/annually

Purpose : NAMS/SLAMS/PAMS/PSD/Special Purpose

Objective : background conc./highest conc./representative conc./maximum population/source impact/other

Scale : micro/middle/neighborhood/urban/regional

Figure 2.0.4.2 (cont.)
Quality Assurance Site Survey Report